Further Note on the Color Curve of the 12-Inch Equatorial of the Lick Observatory

In the February, 1919, number of these Publications an account was given of an investigation of the color curve of the objective of the 12-inch equatorial of the Lick Observatory. In pursuance of the plan mentioned there, we took further measures on the nights of July 16th and 17th, to obtain a more accurate determination of the temperature equation. The method of observing was the same as that described in the previous paper, and the position of the slit with respect to the base plate was measured as before. Six complete sets of measures by the Foucault method were taken, three by each observer; the mean temperature was + 25°.0 C. The resulting "high temperature" color curve is parallel to those for lower temperatures, with a constant difference of 1.67 mm. between this and the curve for 4°.6 C. Thus the temperature equation, as determined from a range of 21°.4 is

$$R = R_0 + 0.08 \text{ mm. } (t - 9°.1),$$

which is identical with the equation obtained before from a range of 9°.

Edith E. Cummings,
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Volume XIII, Publications of the Lick Observatory

A few preliminary copies of Volume XIII, *Publications of the Lick Observatory*, have just been received. The entire edition is thru the press work stage and is undergoing assembly in the bindery department of the *University Press*. It is hoped that distribution of the volume to the correspondents of the Lick Observatory may be made in the month of February. The contents of the volume are as here described briefly by title and otherwise. The several manuscripts were completed at the times set down with each title.

Part I.—Descriptions of 762 Nebulae and Clusters Photographed with the Crossley Reflector, by H. D. Curtis. (March, 1918, pp. 9-42, plus 2 full-page plates.) This paper comprises brief descriptions of all photographs of nebulae made with the Crossley Reflector from 1898, when systematic work was commenced with this instrument at Mount Hamilton, until February 1, 1918.

Part II.—A Study of Occulting Matter in the Spiral Nebulae, by H. D. Curtis. (March, 1918, pp. 45-54, plus 5 full-page plates.) It is well known that certain spiral nebulae seen edgewise or nearly

so, show a dark lane running lengthwise of the nebular image, an appearance generally explained as due to a band of absorbing or occulting matter. It is not so well known that many spirals viewed obliquely with reference to their principal planes show apparently related effects, in that many details of structure are fainter on one side of the apparent axis of figure than upon the other side. The plates accompanying this paper illustrate these phenomena for 78 spiral nebulae.

Part III.—The Planetary Nebulae, by H. D. Curtis. (March, 1918, pp. 57-74, plus 19 full-page plates.) All of the known planetary nebulae north of declination $-34°$ have been photographed with the Crossley Reflector as the basis for various studies of these interesting objects. There are half-tone reproductions of 78 planettaries, varying from those which are described as "stellar" up to the largest-known planetary, N. G. C. 7293. The larger planetaries are reproduced directly from the photographs, but the great majority are reproduced from Dr. Curtis's drawings based on the original negatives. Textual descriptions accompany the illustrations. The paper classifies the planetaries with reference to certain characteristic features, and treats of their apparent distribution and their forms in 3-dimensional space.

Part IV.—The Spectrographic Velocities of the Bright-Line Nebulae, by W. W. Campbell and J. H. Moore. (February 1, 1918, pp. 77-183, plus 14 full-page plates.) The radial velocities have been observed for all known bright-line nebulae except nine, which are too faint for such observations with the means at hand and with exposures of practical length. This refers to bright-line nebulae in the southern hemisphere as observed on Cerro San Cristobal, Santiago, Chile, as well as to northern nebulae observed at Mount Hamilton. The radial velocities of 125 nebulae have thus been determined. Forty-six planetary nebulae were observed at Mount Hamilton for evidences of rotation or internal motion. The observational data were used as the basis for various studies of the planetary nebulae as a class and of special studies of selected nebulae.

Part V.—The Radial Velocity of the Greater Magellanic Cloud, by R. E. Wilson. (June, 1917, pp. 187-190, plus 1 full-page plate.) Seventeen of the known 19 bright-line nebulae in the Greater Cloud were observed on Cerro San Cristobal. It is believed from the

results obtained that the Greater Cloud as a whole has a high velocity of recession with reference to our stellar system.

Part VI.—The Wave-Lengths of the Nebular Lines and General Observations of the Spectra of the Gaseous Nebulae, by W. H. Wright. (July 30, 1918, pp. 193-268, plus 9 full-page plates.) Forty-eight bright-line nebulae were observed, with various spectrographs attached to the 36-inch refractor and the Crossley reflector, but chiefly with a slitless quartz spectrograph attached to the reflector. The wave-lengths of 70 bright lines in the nebular spectrum have been determined with accuracies depending chiefly upon the brightness of the lines. Special studies have been made of the distribution of the nebular materials as represented by the radiations of different wave-lengths. The nuclei of the planetary nebulae have been given careful spectrographic observation. The spectral relationships of the bright-line nebulae and special classes of stars are briefly discussed.

The volume forms one of many in the Semicentennial Series of publications issued by the University of California.

There is obvious regret that the manuscripts of these papers on the nebulae should have remained so long in the hands of the printer, but our sentiments may well be tempered by the thought of vastly greater regrets and misfortunes in the world about us. It is scarcely necessary to say that advances made in the past two years in other departments of astronomical knowledge would have modified these nebular studies in certain particulars, but it was decided to let the manuscripts stand exactly as they were at the dates appended. W. W. CAMPBELL.

January 19, 1920.

THE SIERRA NEVADA MOUNTAINS AND THE YOSEMITE VALLEY, AS SEEN FROM MOUNT HAMILTON

The frontispiece to the present number illustrates some of the advantages of the use of plates made sensitive to the longer wave lengths of light in photographing distant objects. Ordinary photographic plates, it is well known, utilize chiefly the blue and violet light rays; these rays are so scattered by atmospheric haze that distant objects appear blurred upon such plates. The present photograph was taken with a 20-inch-focus camera, using a selenium red color screen and a plate stained with krypto-cyanin, a